REMARKS

The subject application includes pending claims 1-64 which stand rejected under the Office Action of July 26, 2005. Claims 21, 51, 55, 58, and 62 stand rejected under 35 U.S.C. § 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which Applicants regards as the invention. In addition, claims 1-64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,502,884 to Fife ("Fife") in view of either D. Raabe et al., "*Observation of amorphous areas in a heavily cold rolled Cu-20 wt% Nb composite*," Materials Letters, 22 (1995) 155-161 ("Raabe") or U.S. Patent No. 4,378,330 to Verhoeven et al. ("Verhoeven") and further with various combinations with U.S. Patent No. 6,709,536 to Kim et al. ("Kim"); U.S. Patent No. 4,629,515 to Imaizumi et al. ("Imaizumi"); U.S. Patent No.6,521,173 to Kumar et al. ("Kumar"); U.S. Patent No. 5,245,514 to Fife et al. ("Fife II"); U.S. Patent No. 5.908,587 to Gross et al. ("Gross"); U.S. Patent No. 3,849,124 to Villani ("Villani"); and U.S. Patent No. 4,278,623 to Niegisch (Niegisch").

Applicants respectfully traverse the rejections and submit the enclosed amendments and remarks to overcome the rejections.

Rejections under 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected claims 21, 51, 55, 58, and 62 under 35 U.S.C. § 112, second paragraph. The rejection is traversed for the following reasons.

In claim 21, the Examiner states that the alloy "C-103" is either unclear or redundant with the composition of the alloy in claim 46. Applicants have herein canceled claim 21, thereby removing the redundancy.

The Examiner states that claims 51, 55, 58, and 62 are unclear because "hydride dehydride" is not supported in the specification. Applicants respectfully direct the Examiner's attention to paragraph [0041] of the specification of the subject application, where it states that "the fiber material may be rendered into a powder-like consistency through high-speed shearing in a viscous fluid, hydride dehydride and crushing process."

Applicants have addressed the Examiner's rejection of claims 21, 51, 55, 58, and 62. Withdrawal of the rejection under 35 U.S.C. § 112, second paragraph, is respectfully requested.

Rejections under 35 U.S.C. § 103(a)

Fife in view of either Raabe or Verhoeven

Claims 1-7, 9-20, 22-35, 37, 40-43, 45-46, 49, and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven. Applicants respectfully traverse this rejection for the following reasons.

Fife discloses a method for producing fiber-shaped tantalum powder by forming a composite of the tantalum powder and an auxiliary metal and then working the composite by cold mechanical deformation until tantalum fibers are formed. The resulting matrix is then leached to remove the matrix metal. (Column 1, lines 25-32). Using powder metallurgical means "is required in order to avoid thermal cycling of the tantalum powder which would cause undesireable [sic] oxygen pick-up in the tantalum. Temperatures above about 900° C. (1173° K.) would drive surface oxygen into the powder resulting in a hard and unrollable composite material." (Column 1, lines 56-62).

Raabe discloses a Cu-based metal matrix composite containing 20 wt% Nb. The Cu-20 wt% Nb alloy is melted at a melting temperature of at least 1750°C, and in particular, a temperature of 1830-1850°C was employed. The authors' goal was to determine the reasons for the strength of the Cu-20 wt% Nb metal matrix composite ("MMC") and the "dominant goal of the study submitted [was] the examination of the microstructure of the Nb filaments." (Page 155, section 1, second paragraph). The Cu matrix was etched away and the filaments studied by scanning electron microscopy. (Page 156, section 2.2, first paragraph). After etching, the Nb filaments were not further processed.

Verhoeven discloses the formation of a "ductile alloy" suitable for superconducting wire formation. (Column 1, lines 64-65). The alloy is prepared by melting the copper and niobium at a temperature of 1850°C to 1880°C and rapidly cooling to form a matrix. (Column 3, lines 12-17). The purpose of the Verhoeven invention is the production of ductile superconducting wires with extremely fine discontinuous niobium fibers therein. The niobium fibers were not isolated from the matrix.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2143. In addition, the MPEP warns that "the mere fact that references <u>*can*</u> be combined or modified does not

render the resultant combination obvious unless the prior art also suggests the desirability of the combination." *See* MPEP § 2143.01 (emphasis in original).

Applicants submit that a *prima facie* case of obviousness has not been established for at least the reasons that (a) there is no suggestion or motivation to modify the references or to combine the reference teachings and (b) the combined references to not teach or suggest all the claim limitations. Further, there is no evidence of any suggestion of the desirability of combining the references.

The Examiner states that Fife fails to teach the use of casting including melting and cooling the mixture of metals but it would have been obvious to one having ordinary skill in the art to provide Fife the use of melting and cooling, as taught by either Raabe or Verhoeven. However, there is no motivation or suggestion to combine the references and, in fact, Fife teaches away from the combination. Specifically, Fife states powder metallurgical means are required and that temperatures above about 900°C should be avoided to limit thermal cycling and oxygen pick-up. (Column 1, lines 56-62). Raabe and Verhoeven both require liquid (i.e., not powder) metallurgical processes and that the composition be melted at temperatures greater than 1750°C. One skilled in the art would see no motivation or suggestion to combine the teachings of Fife with Raabe or Verhoeven since Fife teaches away from such a combination.

According to the MPEP § 2143.01, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." According to the teaching of Fife, melting the mixture of metals at the temperatures set forth in Raabe or Verhoeven would lead to "a hard and unrollable composite material." (*See* Fife, column 1,

line 62). Working the composite material is a required step of Fife (see Fife, claim 1) and heating at the temperatures of Raabe or Verhoeven would make the method inoperable.

In addition, the combined Fife and Raabe references do not teach all of the aspects of the claims of the subject application. Independent claims 1 and 19 of the subject application include the feature "wherein at least one of a morphology, a size, and an aspect ratio of fiber in the fiber phase is modified by adjusting at least one process parameter." Process parameters that may be adjusted include, but are not limited to, "ratios of metals in the melt, the melting rate, the solidification rate, the solidification geometry, the melting or solidification methods (such as, for example rotating electrode or splat powder processing), the molten pool volume, and the addition of other alloying elements." (Page 11, paragraph [0037]). The Raabe disclosure is directed toward analysis of the fibers embedded in fiber reinforced MMC's. Raabe does not disclose adjusting a process parameter to modify at least one of a morphology, a size and an aspect ratio of the fiber and Fife does not involve a molten liquid process.

Applicants submit that a *prima facie* case of obviousness has not been established for at least the reasons set forth above and respectfully request that the rejection of the claims under 35 U.S.C. § 103(a) be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Kim

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Kim. Applicants respectfully traverse this rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either

Raabe or Verhoeven would render the Fife process inoperable, and the combination of Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Kim does not present a *prima facie* case of obviousness.

In addition, Kim discloses a method for forming a composite metal object comprising ductile crystalline metal particles in an amorphous metal matrix. The alloys are arc melted to form a high temperature melt. (Column 7, lines 21-37).

While exact arc melting temperatures are not disclosed by Kim, the alloyed elements Nb, Zr, Ti, Cu, Ni, and Be have melting points of 2468°C, 1852°C, 1660°C, 1083°C, 1453°C, and 1278°C respectively. Thus, the arc melting process of Kim would necessarily involve temperatures in excess of 900°C. As discussed above, the method of Fife teaches away from high temperature processing conditions, such as temperatures above 900°C. One skilled in the art would see no suggestion or motivation to combine the teachings of Kim with those of Fife, in view of either Raabe or Verhoeven. Applicants respectfully request that the rejection of claim 8 under 35 U.S.C. § 103(a) be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Imaizumi

Claims 21 and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Imaizumi. Claim 21 has been canceled and Applicants respectfully traverse the rejection of claim 46 for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of

Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Imaizumi does not present a *prima facie* case of obviousness.

The Examiner states that "Imaizumi et al (col. 3, lines 20+) teach the use of C-103 (Niobium (Nb) based alloy containing Hf and Ti)." Applicants are unable to find reference to the C-103 alloy in column 3 of Imaizumi. Further, the alloy of claim 46 comprises niobium, 10 wt% hafnium, 0.7-1.3 wt% titanium, 0.7 wt% zirconium and 0.5 wt% tungsten. The only reference in Imaizumi to adding Hf and Ti to Nb occurs at column 5, lines 27-28, where "Hf, Ta, Zr, Ti, etc. are added to the Nb." There is no mention in Imaizumi regarding the weight percent of each of these additives nor is the additive tungsten (a component of claim 46) included in the listing. Given this disclosure, it is unlikely that one skilled in the art would see motivation or suggestion in Imaizumi to use the alloy of claim 46 as a fiber metal. In addition, the combined references do not teach or suggest all features of the claims (i.e., they do not disclose tungsten or weight percentages of Hf, Ti, or Zr). Applicants respectfully request withdrawal of the rejection of claim 46 under 35 U.S.C. § 103(a).

Fife in view of Raabe or Verhoeven and further in view of Kumar

Claims 36 and 44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Kumar. Applicants respectfully traverse the rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of

Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Kumar does not present a *prima facie* case of obviousness.

Kumar teaches a method of making products formed by powder metallurgy using a low oxygen refractory metal powder. There is no evidence showing any motivation or suggestion of the desirability of combining Kumar with Fife and Raabe or Verhoeven. The Fife method requires processing conditions of less than 900°C to prevent undesirable oxygen pick-up. If the melting processes disclosed in either Raabe or Verhoeven were used with Fife and the low oxygen metals of Kumar, Fife teaches that the high temperature processing conditions would still result in the pick-up of oxygen, defeating the purpose of using the Kumar process. Thus, one skilled in the art would not be motivated to combine the Fife, Raabe or Verhoeven, and Kumar references. Applicants respectfully request that the rejection of claims 36 and 44 under 35 U.S.C. § 103(a) be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Fife II

Claims 38-39 and 47-48 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Fife II. Applicants respectfully traverse the rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Fife II does not present a *prima facie* case of obviousness.

Further, Fife II discloses a valve metal material that is structurally stable and having non-tortuous porosity. (Claim 1). Fife II states that capacitor electrodes made from tantalum powder lead to electrodes that can be very tortuous, which "has a disadvantage in the high frequency response of the resultant capacitor as well as adversely influencing the volumetric efficiency." (Column 3, lines 4-16). As discussed above, Fife discloses a process using tantalum powder for the production of electronic circuits. Fife II teaches away from a combination with the method of Fife and, instead, lists several disadvantages of the method. There is no motivation or suggestion to one skilled in the art to combine the teachings of Fife II with Fife. Therefore, Applicants respectfully submit that the rejection of claims 38-39 and 47-48 in view of the combination of Fife with Raabe or Verhoeven, and further in view of Fife II should be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Gross

Claims 50, 54, 57, 60-61, and 64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Gross. Applicants respectfully traverse the rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Gross does not present a *prima facie* case of obviousness.

Further, Gross discloses an injection molding process adapted to the forming of a porous fibrillose body (e.g., an MMC preform). (Column 3, lines 3-6). The

fibrils may be metals, e.g., boron fibers, copper fibers, iron fibers, tungsten fibers, inter alia (column 4, lines 12-13), but preferably comprise ceramic materials (column 4, lines 38-40). The plurality of fibrils are injection molded together with a fugitive binder comprising water and an organic hydrosorbent, the binder burned away, and the remaining fibrils sintered or otherwise bonded together. (Column 3, lines 24-26 and column 4, lines 1-7).

There is no motivation or suggestion to combine the teachings of Gross with those of Fife and either Raabe or Verhoeven. First, the injection molding process of Gross using an organic hydrosorbent is different than the method of producing metal fibers claimed in the subject invention. In addition, the fibrils of Gross are preferably ceramic, and when metal fibers are used, the listed metals do not include niobium, tantalum, or alloys thereof. The fact that Gross discloses sintering at the end of an injection molding process does not suggest or motivate one skilled in the art to combine the injection molding process of Gross with Fife and Raabe or Verhoeven. That Gross can be combined with Fife and Raabe or Verhoeven does not demonstrate that such a combination would be desirable.

A *prima facie* case of obviousness over Fife in combination with Raabe or Verhoeven and further in view of Gross has not been established. Applicants respectfully request that the rejection of claims 50, 54, 57, 60-61, and 64 be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Gross and Villani

Claims 51, 55, 58, and 62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Gross and Villani. Applicants respectfully traverse the rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Gross and Villani does not present a *prima facie* case of obviousness.

Villani discloses process including melting the Nb, Zr and Ti together and cooling to form an ingot, hydriding the ingot to embrittle it, pulverizing the ingot to form a powder, and dehydriding the powder by heating. (Column 5, lines 44-52). Villani involves the formation of a powder by pulverizing an ingot, and not the formation of fibers, such as by the method of the subject application. In addition, Villani discloses a melting process at temperatures in excess of 1000°C (column 3, lines 42-47), whereas Fife teaches away from temperatures in excess of 900°C. There is no suggestion or motivation to one skilled in the art to combine the Villani reference with Fife; Raabe or Verhoeven; and Gross, nor do the references demonstrate that such a combination would be desirable.

A *prima facie* case of obviousness over Fife in combination with Raabe or Verhoeven and further in view of Gross and Villani has not been established. Applicants respectfully request that the rejection of claims 51, 55, 58, and 62 be withdrawn.

Fife in view of Raabe or Verhoeven and further in view of Gross and Niegisch

Claims 52, 56, 59, and 63 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fife in view of either Raabe or Verhoeven and further in view of Gross and Niegisch. Applicants respectfully traverse the rejection for the reasons set forth below.

As discussed above, there is no motivation or suggestion to combine the teachings of Fife with either Raabe or Verhoeven, the combination of Fife with either Raabe or Verhoeven would render the Fife process inoperable, and the combination of Fife with Raabe fails to teach all features of the invention as claimed. Therefore the rejection based on the combination of Fife with either Raabe or Verhoeven further in view of Gross and Niegisch does not present a *prima facie* case of obviousness.

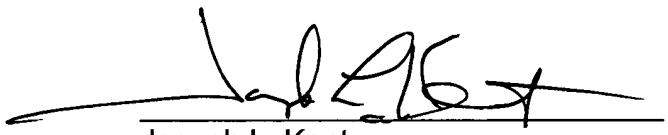
Niegisch discloses a method of forming ultra-fine fibers of organic thermoplastic polymers and inorganic materials, such as glass fibers. (Column 3, lines 30-35). Niegisch does not disclose the use of metal fibers. There is no suggestion or motivation in Niegisch that the method disclosed therein would work on the metal fibers of the subject disclosure.

A *prima facie* case of obviousness over Fife in combination with Raabe or Verhoeven and further in view of Gross and Niegisch has not been established. Applicants respectfully request that the rejection of claims 52, 56, 59, and 63 be withdrawn.

CONCLUSION

Applicant respectfully asserts that the claims of the present application, as amended herein, are directed to subject matter that is patentable over the cited references. Applicant respectfully requests issuance of a Notice of Allowance at an early date. If, however, the Examiner is of the opinion that the instant application is in condition for disposition other than allowance, Applicant respectfully requests that the Examiner contact Applicant's attorney at the telephone number listed below so that those concerns may be addressed.

Respectfully submitted,



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